IMPLEMENTATION OF MANAGEMENT SCIENCE IN MARKETING*

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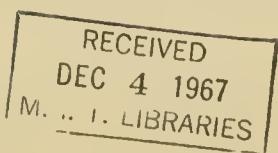
CHAPTER NINE
IMPLEMENTATION OF MANAGEMENT SCIENCE IN MARKETING

INTRODUCTION

The approach to marketing problems developed in the first eight chapters of this book stands in marked contrast to the usual conceptualization and solution of marketing problems. Traditionally, solutions to marketing problems have been based almost entirely on "common sense". This book has sought to understand the elements in management's "common sense" approach and to structure them in models that can be used in an analytical attack on the problems. In most existing marketing decision environments common sense is reflected in simple "rules of thumb" or "heuristics" that represent policies which seemed to be satisfactory in the past. One of the ojbectives of this book has been to develop analytical approaches that expand the scope and depth of the considerations given to specific decisions and thereby improve the quality of existing decision rules. It should be emphasized that this analytical approach does not imply that management judgement will be replaced. Rather, the management science approaches discussed in the earlier chapters will enable management to more effectively use its business judgement.

The transition from the intuitive to the more analytic approach will not be easy nor is it a perfectly certain event. Perhaps the major barriers to the ultimate success of this approach to marketing problems lie in the area of implementing management science approaches in real problem situations. The nature of these barriers and considerations in the successful implementation of this approach will be discussed in this chapter.

PROBLEMS IN IMPLEMENTING THE MANAGEMENT SCIENCE APPROACH IN MARKETING

Marketing, as a management decision area, has been a substantial laggard in the application of management science. While production and finance grew to maturity in terms of management science approaches to problem solving during the 1950's and early 1960's, marketing only now seems on the verge of very rapid and significant development. In fact, marketing might well be described as a "new frontier" for the application of management science. Many problems remain to be structured and there is considerable need for creative new technical approaches. Many examples of these needs have been introduced in the preceding chapters of this book.

If marketing is ever to achieve a mature posture vis-a-vis the application of management science methodology to real problems, it is important that attention be given both to   general and more marketing specific problems which arise in implementing management science solutions. In this section consideration will be given to characteristics of marketing decision problems, marketing managers, management scientists, and the manager-management scientist interface which give rise to significant implementation problems in this area. To be sure, most of the problems discussed below arise in the implementation of management science solutions in all decision areas of the firm; however, it would seem that marketing suffers under the most acute set of implementation barriers.

The Nature of Marketing Problems

In the first chapter of this book several factors characterizing the nature of marketing decision problems were outlined as major contributors to the lag of management science applications in marketing relative to achievements in production and finance. To reiterate, these factors were:

1. Complexity of marketing phenomena

2. High level of interaction between marketing policy variables

3. Competitive reactions

4. Measurement difficulties

5. Instability of marketing relationships

Marketing, existing as it does at the interface of the firm with its environment and consisting virtually entirely of behavioral phenomena, is especially susceptible to the problems outlined above.

A further impediment to progress has been the lack of a free interchange of experience relating to management science applications in marketing. Firms are generally unwilling to discuss successful applications for fear of aiding their competitors. This fear is understandable since marketing is the management decision area which interfaces directly with competitive activity. Furthermore, most firms are unwilling to discuss model failures because of the obvious embarrassment of admitting a mistake. It would seem that progress would be enhanced if by some means better communication could be established concerning both success and failures.

The Marketing Manager

In this section several tendencies of marketing managers are identified as important reasons for slow progress in applying management science in marketing.[1] All marketing managers do not exhibit these tendencies and these tendencies do not completely describe the important characteristics of marketing managers, but they seem to have functioned as constraints on management science progress in marketing.

The first tendency of marketing managers is to be oriented towards immediate and observable results. The intrafirm pressure on the marketing manager to achieve yearly sales, market share, and profit goals require his careful attention to current operations. For example, competition and the firm's adaptation to it usually requires careful monitoring and quick reaction. Consequently, although the marketing manager might prefer to do more planning and analysis, he may only be able to do this by directing less attention to current problems and thereby incur a cost in terms of present results.

Secondly, by training and career experience the marketing manager is not given to analysis and generalization based on analysis. In many instances the marketing manager lacks a sufficient background in quantitative methods and the behavioral sciences to be a good user of management science, which by its nature depends upon these foundation disciplines. Thus, in order to utilize these tools the marketing manager would often have to yield significant decision control to a technician. He has not been willing to do this and, consequently, there has been a lag in the development of management science in marketing. In addition, marketing managers have a tendency to focus on the idiosyncrasies

of each situation. They tend to perceive each situation as a very unique

convergence of circumstances and to distrust attempts at generalization.

While some scepticism of generalizations is necessary and healthy, in

excessive doses it creates strong barriers to the use of management

science, which seeks to represent complex phenomena in terms of their

essential relationships. Hence, the tendency for marketing managers

to see each decision situation as a unique phenomenon has contributed

to marketing's management science "gap".

The Management Scientist

In many respects the perspective of the management scientist is

almost directly opposite to that of the marketing manager. By background

and training the management scientist is oriented toward analysis and

generalization. He attempts to structure the key relationships in a

problem situation in such a way that new decision insights may be gained.

Furthermore, his analytic approach often has as its object the establishment

of a more general set of policies which may be applied under changing

market conditions.

In order to facilitate the structuring and analysis of a market

situation, the management scientist must resort to simplifying

assumptions and generalizations concerning key variables and their

interrelationships. He abstracts the essential aspects from the real

world situation and incorporates these into a model which may be

manipulated to achieve problem insights and marketing policies.

While this abstraction and simplification of the key relationships

and variables is essential to the management science approach, it very

often can and has gone too far.[2]

The management scientist's abstractions must appear reasonable to management if the policy implications of the management scientist's work are to be implemented by operating managers. Too often in the past management scientists have sacrificed reasonable representations of a marketing decision problem for the sake of analytic tractability. Too many so-called applications of management science to marketing have had the appearance of a technique looking for a problem. One suspects that the incidence of this "Have Model, Will Travel" approach has contributed to the erection of implementation barriers in marketing. As management science technology enhances its capacity to solve more complex and realistic problems, this implementation problem will hopefully diminish in importance.

The Manager - Management Scientist Interface

The marketing manager's perspective has been characterized by an orientation toward present results, a perception of the complexity and uniqueness of each decision situation, and an incompatability to analytic approaches. In contrast, the management scientist is oriented to analysis and generalization and utilizes simplifying assumptions to achieve structure and solution capability. Thus it is not surprising that the two often do not mix well. The problem of how to mix these divergent perspectives in a manner profitable to the firm is the basis of the implementation problem. In this section consideration will be given to several viewpoints concerning how this interface should be achieved.

In 1965 Churchman and Schainblatt published what has come to be a much discussed classification of positions to describe the management scientist-manager interface.[3] These four positions are the separate-function position, the communication position, the persuasion position,

and the mutual understanding position. These positions are discussed below.

The separate-function position conceives of management and research as separate functions in the implementation of management science. The technical design and solution is taken to be the perview of the researcher while implementation of the solution is entirely in the hands of the manager. In other words, the researcher is charged with the generation of a theoretical solution, while the manager must see to it that an operational solution is implemented. This separate-function view precludes the need for the researcher and manager to understand each other. Each has a well specified,separate role to play and there is no adaptation to one another.

The communication position holds that it is vital for the manager to understand the researcher. While the scientist must appreciate the need for communicating his solutions such that they can be operationalized, this position sees no great need for the researcher to understand the manager.

The persuasion position is the converse of the communication position. It holds that the researcher must understand the manager in order to overcome managerial resistance to change, to alter managerial attitudes, and to persuade managers to accept recommendations. In this view there is no need for busy managers to understand the researcher.

The mutual understanding position emphasizes the need for both management scientists and managers to understand each other and themselves.

A condition of mutual understanding is deemed necessary if both the manager and the management scientist are to respond effectively to the stimuli provided by the other. Thus it is seen as the key to effective implementation.

In their categorization of these manager-management scientist interface positions Churchman and Schainblatt had in mind a very precise definition of the term "understand". In their words:

> the assertion 'the manager understands the researcher' means that the manager reacts to what the researcher is trying to do in a manner that improves the manager's chances of attaining a purpose empirically assigned to him .[4]

A similar definition holds for the assertion "the researcher understands the manager".

The four positions outlined above are displayed in matrix form in Table 9-1.

Table 9-1
Churchman and Schainblatt's Four Positions on the Manager-Management Scientist Interface

		Management Scientist	
		Understands the Manager	Does not Understand the Manager
Manager	Understands the Management Scientist	Mutual Understanding	Communication
	Does Not Understand the Management Scientist	Persuasion	Separate-Function

The question then arises as to the extent to which managers and
management scientists hold the various Churchman and Schainblatt positions
on the manager-management scientist interface. Dyckman surveyed forty-five
managers in a Cornell executive program and forty-five practicing management
scientists in an effort to examine this question.[5] Each of the four positions
was represented by a statement. The statements appear in Table 9-2. All
four position statements were presented simultaneously and each respondent
was asked to indicate whether he agreed, disagreed, or was neutral on each
of the statements.

<u>Table 9-2</u>

<u>Dyckman's Position Statements</u>

1. Separate Functions:
   The task of the scientist is to prepare as complete a plan as
   possible, taking into account as many aspects of the problem as
   possible and conforming to the standards of scientific research.
   The completed plan is then presented to the manager, whose
   responsibility it is to accept or reject what is proposed.

2. Communication:
   The likelihood of effective implementation of the results of
   scientific research to management problems may <u>BEST</u> be increased
   by a specific action on the part of the manager: he should
   endeavor to understand not only what the researcher does but why
   he does what he does. In this way the manager may react to the
   work to effectively serve his own ends.

3. Persuasion:

   The <u>GREATEST</u> existing obstacle to effective implementation of
   the results of scientific research to managerial problems is
   the lack of researchers in really understanding the important
   issues facing the manager. The scientist, then, must come
   understand the manager by sensing both what makes the manager
   what he is and what the manager is really trying to do.

4. Mutual Understanding:

    Effective implementation of scientific design in the solution of

    managerial problems calls initially for an intellectual attack

    on the mysteries of BOTH management and science; it calls for an

    understanding of the politics of decision making on the one hand

    and an understanding of the creative process on the other.

    Dyckman's results may be summarized as:

1. Both managers and management scientists made restrained use of the

    neutral response. Thus both groups appear to have definite views

    on these issues.

2. The positions are not viewed as mutually exclusive. More than

    double the number of agree responses was observed than would occur

    under the mutually exclusive condition.

3. Managers and management scientists responded differently to the

    questions. For example, management scientists disagreed with the

    separate-function position by a margin of about 5 to 1, whereas

    managers were about evenly divided. Furthermore, managers gave

    the greatest number of agree responses to the communications

    position (the one indicating managers should understand

    researchers better), while researchers gave the greatest number

    of agree responses to the persuasion position (the one in which

    the researcher should understand the manager better).

4. Both groups exhibited a strong belief in the need for some type
    of understanding (communication, persuasion, or mutual understanding),but
    the mutual understanding position does not receive as much agreement
    as the communication and persuasion positions.

With respect to the fourth point, Dyckman found that when the experimental statements were made more clear, simpler, and more general the mutual understanding position became the position which had the greatest number of agree responses.

In a critique of the Churchman and Schainblatt paper Bennis has argued that understanding of unconscious motives (as implied by the mutual understanding position) is not requisite to the establishment of viable and good relationships.[6] The latter may be established via communication and the development of trust. Dyckman sought to assess the extend to which his respondents agreed with only the Bennis position, only the Churchman and Schainblatt position, both positions or neither position. He found that a sizeable majority of both the management scientists and the managers supported the Churchman and Schainblatt position exclusively or concurrently with the Bennis position.

The Dyckman study represents interesting and insightful information bearing on attitudes toward the management scientist-manager interface. What is needed (and probably most difficult to achieve) in the future is evidence as to which position or combination of positions will yield the best implementation results in what kinds of situations. The task of research on implementation of management science has just begun. It is a critical task for management science in general and especially for marketing which exhibits many implementation

problems in the extreme. The Dyckman research has been described in some detail in the hope that this will encourage additional research into the behavioral aspects of implementation.

CONSIDERATIONS IN IMPLEMENTING MANAGEMENT SCIENCE IN MARKETING

The problems discussed in the previous section suggest that there may be considerable difficulties in implementing the models and approaches discussed in this text in solving real world problems. The problem to be addressed in this section is what considerations and methods may be useful in implementing the management science approach in marketing.

To understand the impact of the approach on an organization, the underlying nature of an organization should be investigated. First thoughts of an organization suggest a formal organization chart, but this is to a large extent a sterile method of considering how to implement management science procedures. The organization is the sum of a large number of individuals. These individuals are furthermore grouped into formal and informal groups. These human elements lead to a social structure for the organization. This social structure is not dissimilar to social structures in the large. It is characterized by group interaction, power relationships, and political factions with vested interests. The organization also develops communication networks which are based on personal interaction resulting from friendship patterns and formal information channels. The organization is a complex behavioral nebulae that is influenced by the individual psychological needs of its members and by the sociological requirements of its sub-groups. These comments suggest

that problem solving may not always be the dominant consideration in
an organization and that the organization may not always attempt to
make optimum decisions.[7] The recognition and understanding of these
personal and organizational conditions by both management and management
scientists is precisely the mutual understanding position advocated
by Churchman and Schainblatt.

The problem is to determine how an innovation such as the mathematical
models outlined in this book can be inserted and utilized in an organization.
The first limit on the diffusion of the innovations of management
science in a firm is the prerequisite personnel capabilities in
mathematics and scientific methodology. These abilities are not
prevalent in most organizations. Usually only a few individuals
possess these skills. The organization may procure these skills by
hiring capable employees, training existing personnel, or by enlisting
outside consultants. Assuming some individuals can be obtained with
these skills, the second problem is one of compatibility. Can the
person with these skills function usefully in the social, political,
psychological milieu of the organization?

Since qualified personnel with the requisite skills are
relatively scarce, the possibility of utilizing the personnel possessing
the technology of management science in a "staff" capacity is apparent.
This staff group would act to train managers in analytical techniques
and serve as a consulting group to help solve "line" problems. These
groups become part of the sociological structure of the company and must
operate realizing their existence is dependent upon their effectiveness
in serving other groups.

The success of the management science group will depend upon
1) their ability to communicate with other segments of the company in
understanding and defining realistic and important problems, 2) the
group's ability to solve these problems, 3) the group's ability to
encourage implementation of their solutions. Studies of business
organizations have identified a number of factors which are important
in the effective operation of management science groups. On the basis
of the study of sixty-six large companies, Rubenstein et.al. have
identified ten factors of importance.[8] These factors are grouped
under the three headings outlined below:

1. Ability to generate and define important and realistic problems

    a) receptivity of "line" group to management science group

    b) level of managerial support

    c) organizational location of activity

    d) reputation of management science group in organization

2. Ability to solve problems

    a) technical capability of management science personnel and group

    b) adequacy of resources allocated to management science activities

3. Ability to encourage utilization of solutions

    a) relevance of problem selection for solution

    b) influence MS group and its leaders have in the organization

    c) level of opposition to MS group within the organization

    d) general perception of level of success.

Each topic in this outline, along with some additional considerations,
will be discussed with reference to marketing.

The ability of the management science group to generate and define important and realistic marketing problems will depend upon the empathy that exists between the marketing and management science group (MS group). If the management science group (abbreviated as MS) is organizationally located under the marketing vice president the mutual understanding is likely to be high. If the MS group is located in the production or engineering areas of the company, the empathy needed to generate and define important marketing problems will probably be relatively small. The higher the level of top management support for the MS group the less likely this will be.

This top level support will partly depend upon the ability of the MS group to define and attack relevant problems. It is hoped that the understanding of marketing problems by MS groups has been aided by this book. The last eight chapters have attempted to structure and describe overall marketing problems. This development should help MS groups understand marketing and help marketing personnel to realize the possible contributions of management science in this area. The mutual understanding of marketing problems should lead to a reasonable definition of the problem to be solved. In the definition of this problem, care should be taken not to oversimplify the problem. This is dangerous since it can yield meaningless and irrelevant results that will be detrimental to future MS efforts. The problem should be defined and then a technique should be found to solve it. The problem should dominate the technique.

In searching for a technique to solve a particular problem it should be remembered that the results of applying the technique will be judged by their effectiveness during implementation rather than the theoretical sophistication involved in the solution method. The competence of the MS group should not be measured only by their command of management science techniques but also by their ability to apply them to a given problem with a minimum loss of realism in the problem and resulting solution. The resources available for use in the solution of the problem will also affect the capability of the MS group to solve marketing problems. The concept of the model bank developed in this book should be helpful in this respect. The model bank should include a number of models that yield varying degrees of accuracy at varying levels of cost. With this range of model capabilities, a costs/benefits tradeoff may be made for model usage on any given problem. Hence resources could be allocated to solve problems so as to yield the most effective use of the firm's management science resources.

After a problem solution has been found, the job of the management science group is not finished. If the approach is to yield rewards for the firm, the solutions must be implemented. If the problem selected was mutually designated as important, defined in a relevant manner, and properly solved, the chances of acceptance and implementation will be enhanced. At the implementation stage, empathy is again important. The marketing group must be convinced of the usefulness of the solution and find the implementation compatible with its social and political position in the company. This conviction should be

based on their involvement with the model and the quality of the
solution rather than merely the result of persuasion by the MS group.

The empathy necessary for implementation can be greatly aided
if the manager who is to use the solution was involved in the
derivation of that solution. The information system concepts
outlined in the first chapter and developed throughout the text may
provide a practical mechanism for gaining acceptance and implementation
of management science findings. The notion of a user designed system
that serves to answer managers' questions is highly desirable. The
use of an on-line interactive computer system in conjunction with a
marketing model bank allows the "man" to be put into the management
science solution procedure. By interacting with a model which is
designed to solve his problems, he can explore his subjective feelings
and generate solutions. This high involvement by the marketing manager
in the problem solution should lead to a greater willingness to implement
the solutions yielded by management science techniques.

In initial attempts to involve the "man" or the marketing
manager in the MS system, it may be wise to forego the sophisticated
models that could be applied to the problem. A descriptive model of
how the manager makes this decision may be the best starting point for
involvement of the man in the system. With this descriptive model and
a retrieval system, the manager may see ways to improve his decisions.
This involvement might then provide the basis for an evolution of
the decision maker's model to a more normative level which eventually
results in confidence and involvement in a sophisticated management

science model. The use of an evolutionary approach to the design of
the model bank and information system may yield the greatest long term
rewards for the firm since it will lead to utilization of management
science technology to solve relevant problems and to implemention
of the ensuing MS recommendations. The potential involvement in
solutions may aid in more than the utilization of the outcome. The
man-system involvement may lead to a higher level of support for the
MS group and may reduce the isolation of the MS group during utilization
of its recommendations.

The problems of the MS group and its relationships to marketing
could be overcome if each marketing executive was a manager scientist,
but this would not be healthy. Many of the activities of marketing
people such as motivating salesmen, developing advertising appeals,
generating new product ideas, and handling organizational problems
are not directly within the realm of management science. The marketing
organization will probably be characterized by specialists. The
management science modeling will probably be done by a specialist
so the management scientist-marketing manager consideration outlined
above will be important. The future will contain MS specialists,
but it can be expected that marketing managers will progress through
three stages of development if the management science approach is to
be productively implemented in marketing organizations.

The first stage is a realization that management science techniques
are not to be feared and that they are designed to aid a user (marketing
manager) solve his problems. The second stage is the ability to
overcome the naive confidence that management science techniques can

solve all problems. The manager will always have a vital role in the model design, input, and implementation. The final stage of development will be a mature attitude towards management science. This maturity will be reflected in a realization of the limitation of the management science approach in marketing and the potentialities of the approach in the understanding, exploration, and solution of problems. If this maturing occurs, the place of management science in marketing will be correctly specified and the model building approaches outlined in this text will be correctly used.

SUMMARY

In this chapter marketing was depicted as a funtional management area exhibiting   great barriers to the application of management science. Factors in the nature of marketing problems and in the tendencies of marketing managers and management scientists were identified as causes of the lag in applications of management science in marketing. The sharp contrast between the approach and perspective of the management scientist and the marketing manager identifies the manager-management scientist interface as a key focus in implementation. Four basic positions on this interface were identified and some attitudinal results on each position were presented. Finally, factors which should lead to successful implementations were discussed.

The basic premise underlying this chapter was that management science in marketing will stand or fall on its ability to implement solutions to real problems. Unfortunately, little research has been done in this area. It is vital that a concerted attack be launched on these problems if the full benefits of the management science approach to marketing are to be realized.

FOOTNOTES

[1] For further elaboration of these concepts in the context of sales management see David B. Montgomery and Frederick E. Webster, Jr., "Application of Operations Research to Personal Selling Strategy", Journal of Marketing (Jan., 1968).

[2] For a delightful parody for this problem see Harold Peterson, "The Wizzard Who Oversimplified ", Quarterly Journal of Economics, (May, 1963).

[3] C.W. Churchman and A.H. Schainblatt, "The Researcher and the Manager: A Dialectic of Implementation", Management Science Vol. 11, No. 4, (Feb., 1965), pp.B-69 - B-87. The entire October 1965 issue of Management Science was devoted to commentary on this paper. Other discussions appear in A. Charnes and W.W. Cooper, "Management Science and Management-Some Requirements for Further Development", Management Science Vol. 13, No.2,(October, 1966) pp. C-3 - C-9 and Thomas R. Dyckman, "Management Implementation of Scientific Research: An Attitudinal Study", Management Science, Vol. 13, No. 10, (June, 1967), pp. B-612 - B-620.

[4] Ibid, pp. B-70.

[5] Dyckman op. cit. It should also be noted that Ladd published a more limited survey on students in an operations research class in Donald E. Ladd, "Report on a Group's Reaction to: 'The Researcher and the Manager: A Dialectic of Implementation'", Management Science, Vol. 12, No. 2 (Oct. 1965), pp. B-24 - B-25.

[6] Warren G.Bennis, "Commentary", Management Science, Vol. 12, No.2 (OCtober, 1965), pp. B-13 - B-16.

[7] See Robert C. Ferber, "The Role of the Subconscious in Executive Decision Making", Management Science XIII (April, 1967), pp. B-519 - B-527 and critiques by George Fish and Kenneth A. Longman, Ibid, pp.B-527 - B-529 and B-529-B-533 respectively for a discussion of psychological aspect of decision making.

[8] Albert H. Rubenstein, Michael Radnor, Norman R. Baker, and David R. Heiman, "Some Organizational Factors Related to the Effectiveness of Management Science Groups in Industry", Management Science XIII (April, 1967), pp. 508-518.